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(54) DISK MEDIUM MANAGING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To shorten time required for a seek or the like and also to estimate the worst time of seek required for reading or writing of data by enabling the data to be continuously accessed as much as possible at the time of reading the data from a disk or writing the data to the disk.

SOLUTION: At time of recording a data file on a disk, in a continuous arrangement mode, this method secures continuous areas having arbitrary sizes without performing the recording of data actually and manages even as to unused parts with numbers of divisions and positional information in those areas. Recording orders of the positional information are recorded in orders to be read out from the disk for every division being used and unused divisions are recorded in the order of the increasing of sizes behind them. In the file in

which the continuous areas are secured, since the recording positions on the disk are limited in the areas, an unnecessary seek due to that other data coexist in the same area at the time of reading the data from the disk is not generated and access time can be shortened.

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CLAIMS

[Claim(s)]

[Claim 1] The disk-media management method characterized by securing the continuation field of the magnitude of arbitration on said disk media, without actually recording data on the occasion of recording one data file in the disk-media management method which manages the data recorded on disk media

by file format, and managing also about the operating condition in this continuation field.

[Claim 2] The disk-media management method according to claim 1 characterized by managing only the part currently used as an operating condition in said secured continuation field.

[Claim 3] The disk-media management method according to claim 1 characterized by managing only the part which is not used as an operating condition in said secured continuation field.

[Claim 4] The disk-media management method according to claim 1 characterized by managing both the part currently used as an operating condition, and the part which is not used in said secured continuation field.

[Claim 5] The disk-media management method according to claim 1 characterized by the ability to change securing said continuation field to one data files and not securing said continuation field.

[Claim 6] The disk-media management method according to claim 1 characterized by having a means to compute the maximum seek time at the time of seeking in said secured continuation field.

[Claim 7] The disk-media management method according to claim 1 characterized by having a means to compute the field on the disk media which fulfill the maximum seeking allowed time if the maximum seeking allowed time at the time of seeking in the continuation field which it is going to secure is specified in order to secure said continuation field.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the disk-media management method of the disk unit which carries out record playback of the data, in more detail, this invention secures the continuation field on disk media beforehand to one file,

and relates to the management method used suitable for the video camera equipment which enabled it to manage also about the operating condition in the field, for example, used the disk as the record medium.

[0002]

[Description of the Prior Art] In case data are recorded on a disk, the management information for managing where [of a disk] the recorded data are recorded is required. For this reason, JIS currently widely used by MS-DOS, Windows, etc. as what offers the management technique X UDF by OSTA (Optical Storage Technology Association) currently used with 0605-1990, the common-name FAT system, DVD, etc. is raised, and it is called the logic specification of a disk. By using such logic specification, it becomes possible to distinguish where [of a disk] the data corresponding to the file are recorded by the file name. Moreover, since the directory concept is defined, it becomes possible to express a layered structure.

[0003] Drawing 15 is the schematic diagram showing the relation of the data in the management information and the disk in MS-DOS. In the FAT system which is the file management technique currently used by MS-DOS etc., there is a management descriptor called a directory entry for every directory, and the file and directory which exist in a directory by this descriptor are managed. 32 bytes of information is recorded for every file or directory, and a file name, a filename extension, a file attribute, the last edit time of day, the last edit time, an initiation cluster, and a file size are recorded on the inside which is these 32 bytes.

[0004] When what is managed is a data file, the initiation cluster number and file size on which data are actually recorded are recorded. About how it is actually recorded on the disk, information is acquired by referring to FAT. FAT gives 16-bit information for every clusters of all on a disk, records the cluster number which should access this 16-bit information at a degree, and records information (0xFFFF) to show that it is the very end on the cluster of the very end for constituting a series of files. That is, what is necessary is just to repeat until the starting position cluster number of the data recorded on the disk is known, it follows the cluster number which should be read to the degree managed by FAT for read-out of the data from a disk and 0xFFFF appears by

the management descriptor.

[0005] On the other hand, drawing 16 is the schematic diagram showing the management information in UDF. Explanation of only the part which manages where [on a disk] the file is recorded records in UDF the positional information by which data were recorded on the file entry (File Entry).

Positional information is performed in the unit by which continuation record is carried out, and when divided and recorded on the disk, it manages for every fragmentation. About management of the operating condition of a disk, the tooth-space bit map (Space Bitmap) of drawing 9 explained later may be used.

[0006]

[Problem(s) to be Solved by the Invention] When recording data on disk media, the random access nature of a disk is harnessed. Like drawing 10 Even if it is the file 1 (File1) of the data of one settled units, such as a program and an image, it does not need to be continuously arranged on a disk. It is possible to record to have divided in various locations of a disk and to have called it the file 1-1 (File 1-1), the file 1-2 (File 1-2), and the file 1-3 (File 1-3). However, when reading data, for example from a disk and it is said that data must be read within a certain fixed time amount, the renewal of read-out of data etc. occurs complicated, time amount, such as excessive seeking, is shortened as much as possible, and there is a situation with more desirable having arranged data continuously also from the field of processing speed. Moreover, in the condition that data can write in anywhere on a disk, it is difficult to estimate the access time when actually performing record and playback for data.

[0007] For example, when recording the video data compressed with the MPEG encoder etc. on a disk, it is necessary to record in consideration of the thing at the time of reproducing the recorded data. That is, the image data located in a line with time series need to perform read-out from a disk in the regular time amount, and need to decode it by the decoder of MPEG, and it is necessary to reproduce them as an image. When processing is not completed in the regular time amount, an image will stop in a playback image and it will be in an unnatural condition. The buffer memory for storing temporarily [before decoding MPEG] the image stream of MPEG read from the disk as

the one solution approach for preventing it may be prepared. By collecting data to some extent to this buffer memory, reading of the data from a disk based on step-out [of the servo by the shock from the outside], seeking for reading the data currently divided and recorded, etc. can respond also to the situation of stopping temporarily. However, although it reads from this disk according to the capacity of buffer memory and the allowed time of interruption is decided, if many memory is stacked, there is a certain amount of effectiveness, but if the reading interruption from disks, such as seeking, occurs complicated continuously, possibility that it becomes impossible to attain the seamless nature by which an image is reproduced as time series will also become high. Moreover, after starting playback when it is necessary to collect more data to buffer memory for example, and reproduces in order to lengthen allowed time of the reading interruption from a disk, in order that a certain fixed period may collect data, in order to have to hit, a video output can be obtained during the period and it has a problem.

[0008] Moreover, although the problem of stopping being able to carry out seamless playback cannot occur easily since the data recorded on a disk will be continuously recorded on a disk if they record in an order from the head of a disk only in the case of image data, it is possible that the data of various classes, such as a still picture, voice, management information, and a program, are intermingled on the same disk in fact. Possibility that a still picture and the data with which classes, such as voice, differ will be arranged behind the location of the image data on the disk already recorded on the bottom of such an environment comes out. Image data will be arranged in discontinuous on a disk by this. In case the image data arranged in discontinuous are reproduced, continuous data will not be able to be read, but seeking will enter on the way, and the inflow of the data to buffer memory will stop temporarily. Thus, data arrangement which is in the middle of reading and seeking generates complicated is not desirable.

[0009] Then, it is possible to prevent seeking generating in the middle of reading by other data being intermingled to the same field as much as possible by securing a field beforehand for the data to record and offering structure continuation arrangement is guaranteed to be on a disk.

[0010] In order to realize this, it is necessary to secure beforehand the continuation field of the magnitude which is also the case where data are not actually recorded for the data. Moreover, it is necessary to grasp which part which part is already used to this field by which continuation reservation was carried out, and is not used.

[0011] In the FAT system which is the conventional technique mentioned above, if it is going to secure the continuation field for recording data beforehand, it is necessary to set FAT corresponding to the continuation field to a busy condition. Thereby, since this continuation field is a busy condition, it does not have a fear of that field being used by others and the file. However, since there is no information which part which part is used in the field secured continuously, and is not used, it is necessary to, create separately the management file for recording the use situation on a disk for example, and to correspond.

[0012] Moreover, if it is going to secure the continuation field for recording data beforehand, it is necessary to manage the field as for which continuation reservation was carried out by file extent (File Extent), and in UDF which is the conventional technique mentioned above, it is necessary to set the tooth-space bit map (Space Bitmap) corresponding to the secured continuation field to a busy condition. Although there is no fear of the field being used by others, the file, etc. since the secured continuation field is a busy condition like the case of FAT, from the management information of logical level, it cannot perform acquiring the information which part which part of the secured continuation field is used and is not used.

[0013] Thus, in the conventional management method, beforehand, although it is possible to secure a continuation field, it has the problem that it is difficult to actually manage about the operating condition in the continuation field.

[0014] This invention is proposed in view of an above-mentioned trouble, the continuation field on a disk is beforehand secured to one file, and it aims at offering a management method manageable also about the operating condition in the field by which continuation reservation was carried out to it and coincidence.

[0015] Moreover, since the field where data are arranged can be limited, data

are written in a disk, and it aims at offering the management method of the disk unit which can predict the access time at the time of reading data from a disk to some extent.

[0016]

[Means for Solving the Problem] This invention offers the means for solving such a problem, and invention of each claim is characterized by the following points. In the disk-media management method which manages the data recorded on disk media by file format, the disk-media management method of claim 1 secures the continuation field of the magnitude of arbitration on disk media on the occasion of recording one data file, without actually recording data, and is characterized by managing also about the operating condition in the continuation field.

[0017] The disk-media management method of claim 2 is characterized by managing only the part currently used as an operating condition in the field according to claim 1 by which continuation reservation was carried out.

[0018] The disk-media management method of claim 3 is characterized by managing only the part which is not used as an operating condition in the field according to claim 1 by which continuation reservation was carried out.

[0019] The disk-media management method of claim 4 is characterized by managing both the part currently used as an operating condition, and the part which is not used in the field according to claim 1 by which continuation reservation was carried out.

[0020] The disk-media management method of claim 5 is characterized by the ability to change securing a continuation field to one data files and not securing a continuation field in a disk-media management method according to claim 1.

[0021] The disk-media management method of claim 6 is characterized by having a means to compute the maximum seek time at the time of seeking in said continuation field in a disk-media management method according to claim 1.

[0022] In a disk-media management method according to claim 1, the disk-media management method of claim 7 will be characterized by having a means to compute the field on the disk media which fulfill the maximum

seeking allowed time, if the maximum seeking allowed time at the time of seeking in the continuation field which it is going to secure is specified.

[0023]

[Embodiment of the Invention] An example of the operation gestalt of the disk-media management technique by this invention is explained based on the example indicated to drawing 1 thru/or drawing 14 . In a disk, the logical address is attached in an order from 0 for every smallest unit of logical R/W to the field except an alternative field when parity and a disk have a defect etc. which can actually write in data. A logical-block number, a call, and the magnitude of this logical block are called a logic block size for the address at this time. The operating condition of a disk is managed for every logical block of this. Unless LBN means a logical-block number and has especially explanation hereafter, suppose that the field on a disk points out the thing of a field which can perform R/W of the data with which the logical-block number was attached. Actual data are recorded on this field with the management information for managing the data file to record.

[0024] The file descriptor which manages the directory descriptor and file which manage the basic volume descriptor which stores the basic information on a disk, the tooth-space bit map which manages the operating condition of a disk, and a directory as management information recorded on a disk field is prepared.

[0025] The example about the contents of the basic volume descriptor is shown in drawing 4 . For example, the pointer to the volume name, the volume size, the date and time of creation, tooth-space bit map, and root directory descriptor of this disk is recorded on a basic volume descriptor. The pointer to the descriptor said here means the logical-block number LBN on which the descriptor is recorded.

[0026] Drawing 9 shows the outline of a tooth-space bit map (Space Bitmap). A tooth-space bit map means giving 1-bit information to all the logical blocks on a disk, and using it, when the 1 bit is 0 and the logical block is intactness and 1, and the operating condition of a disk is managed. It becomes possible [each bit of a tooth-space bit map] to grasp which logical block is used by the formula or whether it is used, since it corresponds by the logical-block number

and 1 to 1.

[0027] The example about the contents of the directory descriptor is shown in drawing 5 . For example, the identifier of the directory, the time information on when it was created, the file descriptor of the file stored under the defined directory, the number of the directory descriptors of a directory, and those positional information are managed by the directory descriptor. Positional information here means the logical-block number on which the descriptor is recorded. Moreover, only the number with which positional information is expressed with the number of descriptors will exist.

[0028] The example about the contents of the file descriptor is shown in drawing 6 . In a file descriptor, the number of fragmentation and positional information which are the identifier of the file, the time information on when it was created, a file size, a continuation arrangement attribute, continuation region information, and the information that manages where [on a disk] the data of a file are actually recorded are recorded. Only the number with which positional information is expressed with the number of fragmentation will exist.

[0029] As an initial state, a basic volume descriptor, and a tooth-space bit map and the directory descriptor for root directories will exist in a disk field. For example, the processing in usual which writes the data which it is here in a disk, and creates a file is explained.

[0030] The flow of processing when a data write request occurs in drawing 2 is shown. First, if a file creation demand occurs in step 10, it will judge whether continuation arrangement mode is set up in step 11. Here, since it is the normal mode, the location which searches the free area on a disk and writes in data based on [bit map / tooth-space] the magnitude of the data recorded in step 13 is decided. Under the present circumstances, when the continuation field for magnitude of the data to record is not securable, the field divided on the disk is secured and it considers as a write-in location. When the free area for magnitude of data which wants to write in on a disk does not exist, error processing is performed in step 16.

[0031] In step 14, after actually writing data in this location, the file descriptor shown in drawing 6 for managing the file of a step 15 smell lever is written in a disk. The identifier of the written-in data, a continuation arrangement attribute,

date-and-time-of-creation information, and the positional information on a disk are recorded on this file descriptor. Positional information expresses the block count as the initiation logical-block number of fragmentation as shown in drawing 8 , and 8 bytes of information expresses at a time by 4 bytes. Under the present circumstances, b31 which is the most significant bit of an initiation logical-block number must set to Reserved, and must usually be 0. Next, the tooth-space bit map corresponding to the field which wrote in data is updated to a busy condition. And the logical-block number by which this file descriptor was recorded on the directory descriptor in which the written-in data are contained is added. When a file is created under a root directory, the logical-block number on which the file descriptor of the file created to the directory descriptor which manages a root directory is recorded will be added.

[0032] The flow of processing when the read-out demand of data occurs in drawing 3 is shown. First, if a file read-out demand occurs in step 20, it will judge whether continuation arrangement mode is set in step 21. Here, since it is the normal mode, the file descriptor of the target data is searched from the file name specified in step 23. Since it turns out where [on a disk] the data is recorded from the searched file descriptor, in step 24, data are read from a disk based on the information.

[0033] Generally, taking advantage of the random access nature of a disk, the data of one settled unit which was called program etc. continue on a disk, do not need to be arranged, and may be recorded on various locations on a disk. In such a case, whenever it accesses a discontinuous part, the head of a disk drive will seek the purpose address, and rotational delay etc. will occur. In case data are read from a disk, the data length to read is first specified as the target address, but when the data which should be read are scattered on a disk, the need of publishing the read-out instruction from a disk in a discontinuous part each time comes out. The data which should be read are arranged continuously and it becomes important to make it neither seeking nor rotational delay occur as much as possible to read data for a short time as much as possible, considering such a viewpoint. Then, the means which secures a continuation field as management information and can be managed about the condition is offered. Moreover, since it can limit in the continuation

field where the record location of the data written in as a file was secured, it becomes possible about the worst access time in the field to guarantee the more realistic access time to origin.

[0034] If a means to compute the maximum seek time at the time of seeking in the secured continuation field is used (claim 6), the maximum seek time at the time of the head of a disk drive seeking the target address can be acquired. The maximum seek time is the worst value of the seek time of the head of the disk drive in the secured field. This information is performing a certain writing and reading for example, in the field in two points which separated most physically, and it is in the condition which was at the starting point, and write in a degree, or it reads, or it means the thing of time amount for which writing in case the part to carry out is a terminal point, and reading are interrupted. When this time amount is known, it has the merit that the control at the time of writing the data with which for example, real time nature is demanded becomes easy.

[0035] Moreover, if a means to compute the field on the disk media which fulfill the maximum seeking allowed time if the maximum seeking allowed time at the time of seeking in the continuation field which it is going to secure is specified (claim 7) is used, the field on the disk which fulfills the maximum seeking allowed time can be obtained by giving the maximum seeking allowed time at the time of the head of a disk drive seeking the target address. When the field which fulfills this maximum seeking allowed time is known, it has the merit that the control at the time of writing the data with which for example, real time nature is demanded becomes easy. For example, supposing the maximum seeking allowed time is 0.5 seconds, no matter it may record a series of data which are in the field by arrangement [what], it is guaranteed that the seek time immediately after the point on a disk dividing [data] becomes 0.5 or less seconds.

[0036] The file descriptor about continuation partitioning is explained. There is a continuation arrangement attribute of whether to perform continuation partitioning first in a file descriptor. The management information about a continuation arrangement attribute is shown in drawing 7 . Four kinds of modes are prepared for the continuation arrangement attribute. the "normal

mode" and continuation partitioning which do not perform continuation partitioning perform, "the continuation arrangement mode (the use)", and continuation partitioning which manage about the use part in the field carry out, "continuation arrangement mode (intact)" of managing about the intact part in the field, and continuation partitioning carry out, and "continuation arrangement mode (use -- intact)" 4 ** [manage / about both the use part in the field and an intact part] is. With these four modes, the information which the number of fragmentation and positional information in a file descriptor manage changes.

[0037] The management information in the case of the "normal mode" and the relation of the data in a disk are shown in drawing 11 . In the case of the "normal mode", the number of fragmentation and positional information are used, when a file divides and is recorded on the disk. Since one file is constituted, the record sequence of positional information must be recorded in the sequence which reads data from a disk. The release field in drawing is a free area on the tooth-space bit map, and means the thing of the possible field of recording other files.

[0038] The management information in the case of "continuation arrangement mode (use)" and the relation of the data in a disk are shown in drawing 12 . In "continuation arrangement mode (use)", the operating condition in the field by which continuation reservation was carried out is managed by the number of fragmentation, and positional information. The number of fragmentation in this case manages the number of fragmentation of the part already used in that field. It is necessary to record the record sequence of positional information in the sequence read from a disk for every fragmentation like the "normal mode." It can be found by deducting the part currently used about an intact part from the field by which continuation reservation was carried out. On a tooth-space bit map, a free space in drawing is managed as block used, and means the thing of the field which cannot record other files.

[0039] The management information in the case of "continuation arrangement mode (intact)" and the relation of the data in a disk are shown in drawing 13 . In "continuation arrangement mode (intact)", it is the intact part which is managed by the number of fragmentation, and positional information in the

secured continuation field but like "continuation arrangement mode (use)."

The record sequence of positional information is vacant and must be recorded in an order from what has the large magnitude of fragmentation. For example, a file deducts an intact part from a continuation field, and can read it by connecting the use part from what is recorded previously.

[0040] the management information in the case of "continuation arrangement mode (use -- intact)" and the relation of the data in a disk are shown in drawing 14 . in "continuation arrangement mode (use -- intact)", it shall manage about both use and an intact part all over the field by which continuation reservation was carried out by the number of fragmentation, and positional information It is necessary to record the record sequence of positional information in the sequence which is used first and which is read from a disk for every fragmentation, and it needs to record intact fragmentation on descending of the magnitude after that. In managing a use part and an intact part to coincidence, distinction of whether to have managed the intact part for whether positional information has managed the use part cannot be performed. Then, it distinguishes using the most significant bit b31 by which the begin-block number of positional information is Reserved(ed). When the most significant bit b31 is 0, it means expressing the use part, and when the most significant bit b31 is 1, it shall mean having managed the positional information of an intact part.

[0041] By using these functions according to a situation or a control program, the continuation field for recording one certain file is secured beforehand, and it becomes possible to manage how the information on the file is actually recorded on coincidence in the secured continuation field.

[0042] Here, the case where the image data compressed by MPEG are recorded on a disk is considered. When it sees from a file system, without dividing these data as two files even when recording in addition after considering the image of MPEG as a stream and carrying out a recording start and a halt, it shall treat as one file. Since the MPEG data recorded on the disk are data which synchronized with time amount, if it considers reproducing image data, they need to decode by reading data from a disk within a certain regular time amount, and need to display on a screen etc. When data cannot

be read from a disk in the regular time amount, the image on a screen will stop. The buffer memory for storing temporarily the data read from the disk is prepared so that such a thing may not break out. It is convenient even if the inflow of the data from a disk stops to some extent using the rate of the data which read data from a disk and flow into buffer memory being quicker than the rate which flows out of this buffer memory into the decoder of MPEG.

[0043] As mentioned above, when these MPEG stream data that should be read are scattered on a disk, the inflow of the data to buffer memory will stop for every discontinuous part. While the inflow of this data has stopped, it has prevented an output image etc. stopping by using the data stored in buffer memory. However, if data are here and there scattered too much on a disk, the time amount at which the inflow of the data to buffer memory stops will increase, and it will also be considered that the data stored in buffer memory are lost. Although it is the countermeasures in which increasing the amount of buffer memory also has a certain amount of effectiveness, the time amount for storing sufficient data for this buffer memory shortly is needed, and the balance at the time of thinking as a system worsens. That is, time amount will be taken, by the time it becomes the time amount for are recording of a certain fixed period of the data to buffer memory and image data actually come out on a screen etc., after a user performs a playback demand.

[0044] If based on such a thing, when recording the data of MPEG on a disk, what is written continuously as much as possible is desired. When it is easy to record data continuously only in the case of this MPEG 2 data, but the data recorded on a disk record the data of two or more classes called a still picture, music data, the text, program, etc. on one disk, since these data are intermingled on a disk, there is no guarantee which can write in data continuously.

[0045] Then, in order to write MPEG data in a disk continuously, the continuation field for recording MPEG data beforehand is secured before actually recording data. What is recorded all over the continuation field where the data of other classes were beforehand secured by this can be prevented, and MPEG data become possible [arranging continuously on a disk].

[0046] Here, a processing step is explained taking the case of the case where

this MPEG is actually recorded on a disk. The flow of the processing at the time of a continuation partitioning demand occurring in drawing 1 is shown. When a continuation partitioning demand occurs in step 1 first, it searches whether there is any field of magnitude to carry out continuation reservation using a tooth-space bit map in step 2. When there is nothing, error processing is performed at step 4. If the field which can carry out continuation reservation is found, the continuation attribute of the file descriptor which manages the file corresponding to the MPEG stream recorded in step 3 will be confirmed. This shows that this file is the mode in which a continuation field is secured. Since the continuation attribute is effective, the positional information (an initiation logical-block number and block count) of a continuation field to secure on a disk is recorded on the continuation region information on a file descriptor. And the information on the tooth-space bit map corresponding to the field which carried out continuation reservation is updated. Although data are not written on the disk in fact by this, officially that field will be used, and it becomes impossible for other files to use this field. Reservation of a field finishes it as this.

[0047] Next, the updating step of the management information at the time of actually recording an MPEG stream is explained. In actually recording an MPEG stream on the field by which continuation reservation was carried out, treatment changes [the method of renewal of a file descriptor] with modes of a continuation attribute. For example, the area size by which continuation reservation was carried out at intelligible appearance presupposes that it is the field which can record the image data for 2 hour here. First, suppose that the image data for 10 minutes were recorded on this field. It means using the disk field of the fields which are by 2 hour on a disk, and for 10 minutes. In reading the time of newly starting record, and data as management information, it is necessary to manage where where is used among the field which carried out continuation reservation, and is not used.

[0048] The flow of processing when a data write request occurs in drawing 2 is shown. First, if a file creation demand occurs in step 10, it will judge whether continuation arrangement mode is set up in step 11. Here, since it is in continuation arrangement mode, the location which searches the free area

in a field from the number of fragmentation and positional information in a file descriptor, and writes in data based on the magnitude of the data recorded in step 12 is decided. Under the present circumstances, when the continuation field for magnitude of the data to record is not securable, the field divided in the field by which continuation reservation was already carried out is secured, and it considers as a write-in location. When the free area for magnitude of data which wants to write in the field by which continuation reservation should have been carried out does not exist, error processing is performed in step 16. [0049] In step 14, after actually writing data in this location, the file descriptor for managing the file of a step 15 smell lever is written in a disk. The identifier of the written-in data, a continuation arrangement attribute, date-and-time-of-creation information, and the positional information on a disk are recorded on this file descriptor. As for the number of fragmentation, and positional information, treatment changes as follows with continuation arrangement modes.

[0050] When the continuation attribute of a file descriptor is in "continuation arrangement mode (use)", the initiation logical-block number and its number of logical blocks of the recorded MPEG stream are recorded on the positional information in a file descriptor. The information on the free area in a continuation field can be found by lengthening the positional information of the part currently used from continuation region information by internal processing, such as a microcomputer.

[0051] When the continuation attribute of a file descriptor is in "continuation arrangement mode (intact)", ** is recorded on the positional information in a file descriptor about the empty part of the field which carried out continuation reservation. It sorts to descending of a free area and positional information must be recorded. In this case, in order to specify the location, sequence, etc. that the MPEG stream is recorded, it is possible to manage by the management file which manages the record condition of this MPEG stream separately.

[0052] when the continuation attribute of a file descriptor is in "continuation arrangement mode (use -- intact)", ** is recorded on the positional information in a file descriptor about the empty part of the field which carried out

continuation reservation with the recorded initiation logical-block number and the number of logical blocks of an MPEG stream. As record sequence of positional information, it records about a use part first in sequence for constituting an MPEG stream, and it is vacant after that and the positional information about partial fragmentation is recorded on descending. Whether the mode in the inside in continuation arrangement mode is used will choose the thing suitable for control with a control microcomputer.

[0053] Thus, in order to record an MPEG stream, by treating the inside of the field by which continuation reservation was carried out as one file big officially, it can prevent intermingling the data of other classes to the same field, and can manage also about the operating condition in the field by which continuation reservation was carried out to coincidence.

[0054] When an MPEG stream is serially recorded on the disk of an initial state, in the continuation field secured beforehand, from the beginning, it will be written continuously and will go. However, when it is said that he wants to delete a part of image recorded before, for example from on a disk etc., it will be in a vermin condition about the eliminated part. It is set as the object of the field on the disk which can record MPEG data new naturally also about this part opened wide. Also in this case, above-mentioned continuation arrangement mode demonstrates effectiveness. If it is in the field by which continuation reservation was carried out even if it deletes a part of MPEG stream as already stated, other files cannot use the free area. Moreover, since it is managing also about the use in the secured continuation field, or the condition about an intact part, also when newly recording an image, it can respond easily.

[0055] Moreover, when the continuity of the MPEG stream which repeated edit of partial deletion etc. and was recorded is becoming low, in order to restore a continuity, rearranging an MPEG stream is also considered. If it turns out that only the MPEG stream is recorded on the field by which continuation reservation was carried out in performing this relocation, as compared with the case where the file of other classes etc. is intermingled, it will become possible to rearrange comfortably.

[0056] The image data of MPEG are recorded and the case where he wants

to become less insufficient and to extend a field may arise in the field which carried out continuation reservation beforehand. In such a case, an escape is possible only when the already secured field and the continuous field can newly secure. Moreover, when making a field small conversely, it is effective unless the field to release is actually used.

[0057] This continuation arrangement attribute is not used only for data, such as MPEG, and can be used for the management information which write complicated. Naturally reading of the data from a disk or the writing of data can perform quickly the direction which was able to be performed continuously. Considering this viewpoint, in management information which R/W generates complicated, a system-wide response becomes [the direction which was able to be performed more at the high speed] good. Therefore, also in order to prevent what such management information is divided and recorded on a disk, it is possible to use a continuation arrangement attribute. About the field of the magnitude beforehand assumed in the greatest magnitude or the greatest anticipated-use situation of management information, the continuation arrangement attribute of a file descriptor is confirmed and this continuation field for magnitude assumed is set as continuation region information. Next management is the same as that of the case of the example of MPEG. When the amount of management information increases by this thing as it is used, on a disk, continuation arrangement is guaranteed and it becomes possible to prevent the increment in the time amount of the R/W to the disk by management information dividing and being arranged.

[0058]

[Effect of the Invention] This invention does the following effectiveness so so that clearly from the above explanation. Since the continuation field of the magnitude of arbitration is secured on disk media and it manages to coincidence also about the operating condition in the continuation field, without actually recording data although invention of claim 1 records one data file Although data are not written on the disk in fact, that field will be secured for the defined file and it becomes impossible for other files and directories except this file to use this field. In case it follows, for example, data are read

from a disk, the time amount which the renewal of read-out of data etc. does not generate complicated, and seeking with the excessive head of a disk drive etc. takes can be shortened as much as possible, and it becomes possible to read also from the field of processing speed to a high speed. Moreover, as a file which secured the continuation field, since the record location on a disk is limited in the field, it becomes possible to estimate the worst time amount which write data, and it becomes possible to guarantee the access time.

[0059] In the field according to claim 1 by which continuation reservation was carried out, since invention of claim 2 manages only the part currently used as an operating condition, in managing one file, it secures a continuation field beforehand and becomes possible [managing also about the part which is using the interior of the field for coincidence].

[0060] In the field according to claim 1 by which continuation reservation was carried out, since invention of claim 3 manages only the part which is not used as an operating condition, in managing one file, it secures a continuation field beforehand and becomes possible [managing also about the part which does not use the interior of the field for coincidence].

[0061] In the field according to claim 1 by which continuation reservation was carried out, since invention of claim 4 manages both the part currently used as an operating condition, and the part which is not used, in managing one file, it secures a continuation field beforehand and becomes possible [managing also about both the part which is using the interior of the field for coincidence, and the part which is not used].

[0062] Invention of claim 5 becomes possible [giving flexibility to the management technique by changing securing a continuation field to one data files, securing a continuation field to one data files, since it changes not securing a continuation field, and not securing a continuation field] in a disk-media management method according to claim 1.

[0063] Since invention of claim 6 has a means to compute the maximum seek time at the time of seeking in the secured continuation field in a disk-media management method according to claim 1, the control at the time of writing the data with which the maximum seek time at the time of the head of a disk drive seeking the target address can be acquired, for example, real time

nature is demanded becomes easy.

[0064] Invention of claim 7 is set to a disk-media management method according to claim 1. If the maximum seeking allowed time at the time of seeking in the continuation field which it is going to secure is specified By giving the maximum seek time at the time of the head of a disk drive seeking the target address, if a means to compute the field on the disk media which fulfill the maximum seeking allowed time is used The control at the time of writing the data with which the field which fulfills the maximum seeking allowed time can be obtained, for example, real time nature is demanded becomes easy.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the flow chart which shows the processing at the time of a continuation secured demand occurring.

[Drawing 2] It is the flow chart which shows the processing at the time of a data write request occurring.

[Drawing 3] It is the flow chart which shows the processing at the time of a data read-out demand occurring.

[Drawing 4] It is drawing showing a basic volume descriptor.

[Drawing 5] It is drawing showing a directory descriptor.

[Drawing 6] It is drawing showing a file descriptor.

[Drawing 7] It is drawing showing the detail of a continuation arrangement attribute.

[Drawing 8] It is drawing showing the positional information recorded on a file descriptor.

[Drawing 9] It is drawing showing the outline of a tooth-space bit map.

[Drawing 10] It is drawing having shown signs that one file could divide and record on a disk.

[Drawing 11] It is drawing having shown the situation of the relation between the management information in the normal mode, and the data on a disk.

[Drawing 12] It is drawing having shown the situation of the relation between the management information in continuation arrangement mode (use), and the data on a disk.

[Drawing 13] It is drawing having shown the situation of the relation between the management information in continuation arrangement mode (intact), and the data on a disk.

[Drawing 14] It is drawing having shown the situation of the relation between the management information in continuation arrangement mode (use -- intact), and the data on a disk.

[Drawing 15] It is drawing showing the outline of the relation between the management information of the FAT system which is the conventional technique, and the data on a disk.

[Drawing 16] It is drawing showing the outline of the management information in UDF which is the conventional technique.
